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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the manufacturing method of a liquid crystal display panel.

[0002]

[Description of the Prior Art]After carrying out spreading formation of the photosensitive substance (orienting film) in a substrate face as a method to which the orientation of the liquid crystal element is made to carry out in the predetermined direction, the method of carrying out orientation treatment by UV irradiation is shown in JP,4-7520,A etc. It explains referring to drawings for the outline of the orientation treatment by this conventional optical exposure below. Drawing 5 is a perspective view showing the outline of this photo alignment processing, and to the substrate 56 which applied the photosensitive substance 55 for orientation to the surface. The ultraviolet rays from the ultraviolet ray sources 51, such as a high-pressure mercury lamp or laser, are made into a parallel ray with the collimator 52, And by irradiating with the light 54 linear-polarization-ized using the polarization device 53 which consists of an optical element of a linear polarization plate or the Gulan Thompson mold shows how to carry out orientation treatment of the photosensitive substance 55.

[0003]At this time, the orientation direction and pre tilt angle of a liquid crystal element, Since it is controllable by the direction of a polarization vector, irradiation energy, an energy angle, etc., Liquid crystal display panels, such as common-name homogeneous orientation mode, homeotropic orientation mode, an OCB mode (optical compensation double reflex mode), a TN mode (twist pneumatic), and STN mode (super twist pneumatic), are manufactured by control of the above-mentioned monograph affair. An example of the liquid crystal display panel manufactured using two substrates by which orientation treatment was carried out by the above-mentioned optical exposure is shown in drawing 6. The figure is a sectional view

showing the outline composition of the liquid crystal panel which held the predetermined gap and pasted the two aforementioned substrates together, after it separates the cell gap  $d$  and pastes together the two substrates 56 which have the photosensitive substance 55 by which orientation treatment was carried out, sticks the polarizing plate 57 on the outside of the two substrates 56, and is constituted. 58 is seals resin and 59 is a liquid crystal.

[0004]

[Problem(s) to be Solved by the Invention]However, in order that a STN mode liquid crystal display panel, a TN mode liquid crystal display panel, etc. may give a display function electrooptically, As an optical member, a linear polarization plate is indispensable to itself, and in said conventional method. The device which prepared the optical system which prepared the optical element 53 which linear-polarization-izes ultraviolet rays for irradiating the photosensitive substance (orienting film) 55 with the light 54 which the ultraviolet wavelength as shown in drawing 5 linear-polarization-ized is used, When there was a problem that the optical system at the time of manufacture becomes complicated and orientation modes, such as the peculiar orientation mode, for example, HM, TN, and ST, were formed in a liquid crystal display panel, the work had to be done before panel lamination and this had become manufacturing restrictions.

[0005]It aims at this invention's solving the above-mentioned conventional problem, and attaining simplification of an orientation treatment process, and providing the manufacturing method of the liquid crystal display panel which can manufacture arbitrarily the liquid crystal display panel which has orientation modes, such as HM, TN, and ST, also after panel lamination.

[0006]

[Means for Solving the Problem]A manufacturing method of a liquid crystal display panel of this invention is provided with a process of applying a photosensitive substance to one side of a substrate, a process of pasting a linear polarization plate together to one side of another side of a substrate which applied said photosensitive substance, and a process of irradiating with ultraviolet rays through said linear polarization plate, and performing photo alignment processing to said photosensitive substance.

[0007]Since a linear polarization plate of a component member of a liquid crystal display panel performs linear-polarization-izing and an optical exposure of an ultraviolet ray source required for a photo alignment exposure according to this invention, Since predetermined orientation treatment can be carried out by optical exposure also after being able to omit an optical system of linear-polarization-izing with a photo alignment provided separately conventionally and pasting a liquid crystal panel together, After panel lamination, a liquid crystal display panel which has orientation modes, such as TN, STN, and OCB, for example can be constituted.

[0008]

[Embodiment of the Invention]It explains referring to drawings for each embodiment of this invention below.

[0009](Embodiment 1) Drawing 1 is a perspective view showing the outline of the photo alignment processing in Embodiment 1 of the manufacturing method of the liquid crystal display panel of this invention. In a figure, the photosensitive substance 15 which serves as an orienting film at one field side of the substrate 16 for liquid crystal panels is applied (the 1st process), The linear polarization plate 13 is pasted together to the field side of another side (the 2nd process), and the photosensitive substance 15 is irradiated with the light 100 which made the substrate 16 the ultraviolet rays from the ultraviolet ray source 11 of high voltage or a low-pressure mercury lamp with the collimator 12 at the parallel ray, and was linear-polarization-ized through the linear polarization plate 13 (the 3rd process). The wavelength of the ultraviolet ray source 11 which carries out an optical exposure at this time can use the field 254 nm, 300 nm, and near 365 nm. As this photosensitive substance 15, a polyacrylate system, a polyvinyl system, an amide system, and an imide system can be used, and materials, such as a silane compound and a polysilane compound, and the material which the above-mentioned material system mixed can also be used further.

[0010]An example of the liquid crystal display panel manufactured using two substrates in which photo alignment processing was carried out by said 1st process thru/or the 3rd process is shown in drawing 2. The figure is a sectional view showing the outline composition of the liquid crystal panel which held the predetermined gap and pasted the two aforementioned substrates together, After separating the cell gap d and pasting together to the field side the polarizing plate 13 and the two substrates 16 which have the photosensitive substance 15 by which orientation treatment was carried out to the field side of another side as mentioned above [ while ], the liquid crystal 19 is inserted into the above-mentioned gap d, and it is constituted. 18 is seals resin. Thus, since orientation treatment of the photosensitive substance 15 is carried out by the optical exposure, orientation of the molecule of the inserted liquid crystal 19 is carried out in the predetermined direction.

[0011]As mentioned above, according to this embodiment, perform photo alignment processing using the linear polarization plate used as a component member of a liquid crystal display panel, and. By using the polarizing plate used for this photo alignment processing also for the composition of a display panel, pasting this together to a substrate, and completing a liquid crystal display panel, the optical system in the photo alignment at the time of manufacture is simplified, and various orientation modes of a liquid crystal display panel can be realized easily. For example, when it constitutes TN (twist pneumatic) mode in the orientation mode used for a liquid crystal display panel, Are feasible by pasting together so that the molecule of the liquid crystal 19 inserted in the gap d of two substrates in the sectional view of drawing 2 may take an abbreviated 90 degree angle mutually on the surface of the

photosensitive substance 15 of both sides, When it constitutes STN (super twist pneumatic) mode, it becomes feasible by pasting together so that this may take the angle not more than more than abbreviated 180 degree 270 degree. Naturally not only the case in the above-mentioned TN mode and STN mode but the thing pasted together to arbitrary angles is possible for these angles to paste together.

[0012](Embodiment 2) Drawing 3 is a perspective view showing the outline of the photo alignment processing in Embodiment 2 of the manufacturing method of the liquid crystal display panel of this invention. In a figure, spreading formation of the photosensitive substance 35 which becomes the one side on the surface of both sides of the two substrates 36 with an orienting film is carried out (the 1st process), and after sticking the linear polarization plate 33 on the one side of another side (the 2nd process), the fixed gap d is held and pasted together (the 3rd process). Although an optical exposure is carried out by the same method as said Embodiment 1 in this state, using the ultraviolet ray source 31 and two sets of collimators 32 or other means perform this optical exposure from the both sides by the side of the surface of the two substrates 36, and a rear face (the 4th process). The degree of orientation angle and the wavelength of the ultraviolet ray source 31 which carries out a both-sides light exposure can use the same field as Embodiment 1.

[0013]Next, since photo alignment processing of the photosensitive substance 35 is beforehand carried out if a liquid crystal is inserted in the gap d of the above-mentioned liquid crystal display panel in which photo alignment processing was carried out by said 1st process thru/or the 4th process, orientation of the liquid crystal inserted in the above-mentioned gap d is carried out in the predetermined direction like Embodiment 1.

[0014]As mentioned above, at the same time it performs photo alignment processing using the linear polarization plate used as a component member of a liquid crystal display panel according to this embodiment, Various orientation modes which the optical system at the time of manufacture is simplified, and are used for a liquid crystal display panel also after panel lamination can realize this polarizing plate easily by being used also for the composition of a liquid crystal display panel naturally, pasting this together to a substrate, and completing a liquid crystal display panel.

[0015](Embodiment 3) Drawing 4 is a perspective view showing the outline of the photo alignment processing in Embodiment 3 of the manufacturing method of the liquid crystal display panel of this invention. In a figure, spreading formation of the photosensitive substance 45 which becomes the one side on the surface of both sides of the two substrates 46 with an orienting film is carried out (the 1st process), After sticking the linear polarization plate 43 on the one side of another side (the 2nd process), the fixed gap d is held and pasted together (the 3rd process), and the liquid crystal 49 is inserted into the above-mentioned gap d after that (the 4th process). 48 is seals resin of the liquid crystal 49. means, such as using the ultraviolet

ray source 41 and two sets of collimators 42 like Embodiment 2 in this state, -- the optical exposure from the both sides of the two substrates 46 -- carrying out (the 5th process) -- the wavelength of that ultraviolet ray source 41 uses 365 nm. This is because a possibility that the molecule of the already inserted liquid crystal 49 will decompose is strong, when it irradiates with light (254 nm and 300 nm).

[0016]As mentioned above, according to this embodiment, perform photo alignment processing using the linear polarization plate used for a liquid crystal display panel, and. Various orientation modes which the optical system at the time of manufacture is simplified, and are used for a liquid crystal display panel also after panel lamination can be easily realized by using the polarizing plate used for this photo alignment processing also for the composition of a display panel, pasting this together to a substrate, and completing a liquid crystal display panel.

[0017](Embodiment 4) Although Embodiment 4 of the manufacturing method of the liquid crystal display panel of this invention transformed the optical exposure by the ultraviolet ray source in said Embodiment 2 and Embodiment 3 and the optical exposure was carried out from the both sides of the substrate in each of these embodiments, It is made to carry out the optical exposure of this only from one side of one substrate.

[0018]Thus, when an optical exposure is carried out only from one side of one substrate, orientation of the photosensitive substance applied to this single-sided board is carried out in the predetermined direction, and orientation also of the molecule of the liquid crystal of that surface is carried out in the predetermined direction, but. It is possible to carry out orientation, when the photosensitive substance applied to the substrate of another side also raises optical irradiation intensity, and since orientation will be performed to a uniform direction on the photosensitive substance surface of both sides if it does in this way, it is suitable for manufacture of the liquid crystal display panel based on the homogeneous mode.

[0019]

[Effect of the Invention]Since linear-polarization-izing and an optical exposure of an ultraviolet ray source required for a photo alignment exposure are performed using the linear polarization plate of the component member of a liquid crystal display panel as mentioned above according to this invention, Since an optical exposure can perform predetermined orientation treatment after being able to simplify the optical system in a photo alignment and pasting a liquid crystal panel together, the advantageous effect that the liquid crystal display panel which has orientation modes, such as TN, STN, and OCB, after panel lamination can be constituted is acquired.

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[Translation done.]